

Add the following new claim:

25. A filter element according to claim 10 wherein  
prior to introduction onto said supporting pipe, said mat filter has an interior diameter less  
than an exterior diameter of said supporting pipe forming an interference fit therebetween along an  
entire axial length of said mat filter.

### REMARKS

By the present Amendment, claims 10, 11-13 and 23 are amended, and claim 25 is added.  
This leaves claims 10-25 pending in the application, with claim 10 being the sole independent  
claim.

### Objection to Drawing

In response to the objection to the drawings under 37 C.F.R. § 1.83(a), submitted herewith is  
a corrected drawing of Figure 1 with an arrow indicating the cleaned out fluid flow out of outlet  
opening 42 as described on page 9, lines 1-3. This new drawing figure obviates this objection, such  
that the drawings now comply with 37 C.F.R. § 1.83(a).

### Claim Objections and Rejections Under 35 U.S.C. § 112, Second Paragraph

Claim 10 is amended to change "filter mat" to "mat filter" in the last line thereof to correct a  
typographical error.

The phrase "to form said sealing seam" is added to each of claims 11-13, as proposed,  
without limiting the scope of the claims.

Claims 10-24 stand rejected under 35 U.S.C. § 112, second paragraph as being indefinite regarding the recitation of "forming an interference fit therebetween" in claim 10, line 9. In support of that rejection, it is contended that the mat filter cannot form an interference fit with the casing without the support pipe. However, the mat filter substantially forms a hollow cylinder that can form an interference fit with the casing without the internal supporting pipe. The exterior outer diameter of the cylinder formed by the mat filter, prior to being compressed, is greater than the interior or inner diameter of the casing. These two diameters alone produce an interference fit.

A separate and second interference fit can be produced, according to the preferred embodiment, by making inner diameter of the mat filter less than the outer diameter of the support pipe. However, that second interference fit is not required to produce the interference fit of the mat filter with the casing, as recited in claim 10. Moreover, claim 10 recites that the mat filter engages the supporting pipe.

Relative to claims 17-20, the recitation of "recyclable plastic material" is alleged to be unclear. However, this recitation merely means plastic material that is capable of recycling according to conventional methods, as discussed in the attached portions of the Kirk-Othmer Concise Encyclopedia of Chemical Technology and Whittington's Dictionary of Plastics. Moreover, "recyclable plastic" and similar terminology has been accepted in the claims of numerous patents. See, e.g., U.S. Patent Nos. 6,250,004, 6,425,581, 6,409,374 and 5,687,855. Reconsideration and withdrawal of the objection to claims 17-20 is requested.

Accordingly, the presently pending claims are definite and comply with the requirements of 35 U.S.C. § 112.

Rejection Under 35 U.S.C. § 103

Claim 10, as amended, covers a filter element comprising a fluid-permeable supporting pipe 10, a resilient mat filter 12, a plastic filter casing 16 and two end caps 20 and 22 connected to the filter casing. The mat filter is folded into a cylindrical shape and pushed open on the supporting pipe to surround and engage the supporting pipe. The plastic filter casing has openings 18, encloses the mat filter and delimits a filter chamber. A flat blank is used to form the filter casing with the opposite ends of the blank bent toward one another and joined by a sealing seam. The cylindrical shape of the mat filter has an exterior diameter prior to introduction into the casing larger than an interior diameter of the filter casing to form an interference fit between the filter casing and the mat filter along the entire length of the mat filter. One axial end of the mat filter is formed into a conical shape to facilitate its introduction into the filter casing.

By forming the filter element in this manner, the mat filter is supported directly on the filter casing by the interference fit, along its entire length, resulting from the relative dimensions of the mat filter and the filter casing. This support provides a mat filter which is free of play within the casing such that no gap or play exists between the outside of the mat filter and the inside surface of the casing. The presence of such a gap between the mat filter and the inside surface of the casing, as in the cited prior patents, is disadvantageous. Under working conditions, the fluid passing through the filter element will tend to move the mat filter, particularly the pleats thereof, adversely affecting the filtering capacity of the mat filter. Frictional forces between the filter element pleats will reduce the effective life of the mat filter. The claimed construction also provides a more compact filter element in which one pleat can support adjacent filter pleats.

Claims 10-14 and 17-24 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 3,200,953 to Komarmy in view of U.S. Patent No. 3,460,680 to Domnick. The

Komarmy patent is cited for a filter element 14 having a permeable supporting pipe 18, a resilient mat filter 26 folded into a cylindrical shape about an engaging supporting pipe 18, and a filter casing with openings enclosing the mat filter and defining a filter chamber. The filter casing is alleged to be a flat blank of metal with opposite ends bent toward one another and joined to form a sealing seam. The Komarmy mat filter is alleged to have an exterior diameter, prior to its induction into the casing, at one end to form an interference fit. The description of the Komarmy patent, column 2, lines 53-56, allegedly discloses a conical shaped mat filter. The Domnick patent is cited for disclosing a supporting pipe, filter casing, and mat filter of plastic, with the casing formed from a flat blank with opposite ends bent toward one another and joined by welding of various types. In support of the rejection, it is contended that it would be obvious to modify the Komarmy filter element by making the casing, mat filter, supporting pipes and ends of recyclable plastic material. All plastic is alleged to be recyclable. The method forming the seams is considered obvious or is a product-by-process limitation which is not given patentable weight.

The Komarmy patent discloses a mat filter folded into a generally cylindrical shape which is then inserted between the supporting pipe 18 and casing 26. The casing has grooves 32 and 34 adjacent to its ends which engage that filter and force it against the supporting pipe. Additionally, the supporting pipe has a plastic ring 36 which causes the mat filter to bow outwardly at its center. As an alternative to bowing outwardly, the Komarmy mat filter can be made to be generally frustoconical.

In this manner, the Komarmy mat filter only forms an interference fit at the two annular regions adjacent the ends at the circumferential grooves 32 and 34. The remainder of the outer periphery of the mat filter is radially spaced from the inner surface of the casing, as clearly illustrated in Komarmy patent Fig. 1. Additionally, the inner surface of the mat filter is spaced

from the pipe 18, except at the portions at its ends and along ring 36. The spacing is necessary to provide the bulging which is important in the Komarmy patent.

In contrast, the present invention has the interference fit along its entire length to avoid movement of the filter plates relative to the both the casing and to the supporting pipe.

Nothing in the Komarmy patent or the Domnick patent provides any motivation to vary the relative diameters of the mat filter and the filter casing. Moreover, no disclosure in these patents provides any suggestion or motivation to provide a mat filter with an exterior diameter larger than the interior diameter of the casing to provide the claimed interference fit along the entire mat filter length. Such interference fit is a feature of the final product which is absent from the filter elements disclosed in the cited patents.

Accordingly, amended claim 10 is patentably distinguishable over the cited patents.

Claims 11-25, being dependent upon claim 10, are also allowable for the same reasons. Moreover, these dependent claims recite additional features distinguishing each of them independently over the cited patents.

Relative to claims 11-13, it is alleged that the joining by a heat seal or weld is a product-by-process limitation and not a structural limitation. However, such interpretation is clearly contrary to In re Garner, 162 USPQ 221, 223 (C.C.P.A. 1969), wherein the Court held that such seemingly apparent process limitations as "'etched", "welded", and "interbonded by interfusion" are considered structural limitations not subject to the product-by-process rules. Thus, the decision of In re Thorpe, 227 USPQ 964 (Fed.Cir. 1985) is inapost, since product-by-process limitations are not involved.

Claim 14 is further distinguishable by the pleating and folding of the filter, particularly within the overall claimed combination.

Claims 15 and 16 are further distinguishable by the weld and heat seal recited therein, respectively. These limitations are not product-by-process limitations, but are structural limitations. In re Garnero, supra. Also, such claims are not obvious when further considered in view of U.S. Patent No. 3,867,294 to Pall.

Claims 17-20 are further distinguishable by the use of recyclable plastic material, particularly within the overall claimed limitation.

Claims 21 and 22 are further distinguishable by the punched out holes recited therein, particularly within the overall claimed combination.


Claims 23 and 24 are further distinguished by the sealing seams having intermittent contact points (claim 23) or an overlapping area of the filter casing ends (claim 24), particularly within the overall claimed combination. Such features are not adequately taught or rendered obvious in view of the additional citation of U.S. Patent No. 3,560,131 to Yotsumoto. Further, such rejection involves the modification of a modifying reference, further demonstrating the unobviousness of the claimed subject matter.

Claim 25 is further distinguished by the second interference fit between the mat filter and the supporting pipe.

In view of the foregoing, claims 10-25 are allowable. Prompt and favorable action is solicited.

Respectfully submitted,

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[MARKED-UP CLAIMS]

10. (Twice Amended) A filter element, comprising:

a fluid-permeable supporting pipe;

a resilient mat filter folded into a cylindrical shape and pushed open on said supporting supportive pipe to surround and engage said supporting pipe;

a plastic filter casing with openings enclosing said mat filter and delimiting a filter chamber, said filter casing being formed from a flat blank with opposite ends thereof bent toward one another and joined together by a sealing seam, said cylindrical shape of said mat filter having an exterior diameter prior to introduction into said casing larger than an interior diameter of said filter casing forming an interference fit therebetween along an entire axial length of said mat filter;

two end caps connected to said filter casing; and

one axial end of said mat filter being formed into a conical shape to facilitate introduction thereof in said filter casing;

whereby, said mat filter [mat] is supported directly on said filter casing and said supporting pipe.

11. (Amended) A filter element according to claim 10 wherein

said ends of said filter casing are joined by a heat seal to form said sealing seam.

12. (Amended) A filter element according to claim 10 wherein

said ends of said filter casing are joined by a heating element to form said sealing seam.

13. (Amended) A filter element according to claim 10 wherein  
said ends of said filter casing are joined by an ultrasonic weld to form said sealing seam.
23. (Amended) A filter element according to claim 10 wherein  
said sealing seam[s] comprises intermittent contact points of said ends of said filter  
casing.